Right: The STS-83 crew takes a break during the Terminal Countdown Demonstration Test. From left are Mission Specialist Don Thomas, Payload Specialist Greg Linteris, Pilot Susan Still, Commander Jim Halsell, Mission Specialist Mike Gernhardt, Payload Specialist Roger Crouch and Payload Commander Janice Voss. Center: The Microgravity Science Laboratory is installed into the payload canister for shipment to *Columbia*'s cargo bay.

NASA Photos KSC-97EC-461 and KSC 97PC-243

Spacelab Sets Stage for Space Station

Microgravity Science Laboratory tests hardware, procedures for next generation of experiments

By Karen Schmidt

An international team of scientists will lay the foundation for space station work during the STS-83 mission.

Columbia is set to lift off from Launch Pad 39A at Kennedy Space Center at 1:01 p.m. CST Thursday carrying the Microgravity Science Laboratory nestled in its cargo bay. Four space agencies developed the 33 investigations for the Spacelab that will test hardware, procedures and new facilities for use on the International Space Station.

Representatives from the German Space Agency, European Space Agency and the National Space Development Agency of Japan are joining NASA's seven crew members in their search for procedures that may be used on the station. Commander Jim Halsell, Pilot Susan Still, Payload Commander Janice Voss, Mission Specialists Mike Gernhardt and Don Thomas, and Payload Specialists Roger Crouch and Greg Linteris will spend 16 days on low-Earth orbit conducting a variety of science experiments in the versatile research lab.

"Scientists and investigators are coming from around the world converging on the Payload Operations Control Center (at Marshall Space Flight Center)," Halsell said. "From that location they will be talking to us on orbit, to help us in our efforts to get the most science during the 16 days that we'll be in space."

The crew will split into two teams and work around the clock conducting experiments with various materials and liquids and documenting changes in microgravity. The Red Team will consist of Halsell, Still, Thomas and Linteris. Voss, Gernhardt and Couch will make up the Blue Team.

"This is the last materials processing Spacelab flight and will be the heaviest and most video-downlink intensive Spacelab mission to date," said Rob Kelso, STS-83 lead flight director. "It brings us to the end of an era of all the Spacelab missions that started back on STS-9."

STS-83 will close an era and open doors for future microgravity experiments on the ISS. The Expedite Processing of Experiments to the Space Station, or EXPRESS, rack will house two experiments and engineers will have the opportunity to check the design, development and adaptation of the rack for use on the space station. One experiment will study changes that occur when a substance makes the transition from liquid to solid and back again.

In addition to materials science, the rack will contain a variety of plants that will help researchers learn more about growing food and healing plants in space. The crew will grow clover and spinach in a small greenhouse.

"We are also taking plants of sage and periwinkle," Thomas said. "These plants have great pharmaceutical applications down here on Earth. We hope that this research we are performing on this mission will help benefit those on Earth through the development of good pharmaceutical drugs."

New expert software also will be tested during STS-83. The software is designed to reduce the number of people required to support station activities and give immediate information about each experiment and mission operations.

The crew will conduct experiments with metals in the German-built Electromagnetic Containerless Processing Facility, called TEMPUS for its German acronym.

"We can electromagneticly levitate a small metallic sample and heat it up and cool it down all in a containerless fashion so we don't get any contamination from the outside environment," Thomas said. "In this way we can get some new, unique structures."

Metal fusion studies also will be conducted during the 16-day mission. The large Isothermal Furnace will heat metal alloys to 2,912 degrees and scientists will study how metals fuse together during cooling.

"The purpose of this is to be able to form homogenous materials that are critical for building super high speed computers or ultra small electronic chips," Crouch said. "A lot of these experiments will be automated and controlled from the ground and in fact, part of the commands will come from Japan, through NASA, then up to the space shuttle. We are practicing worldwide control of these experiments."

Several combustion experiments will look at how fire behaves in microgravity. The combustion module contains a 24-gallon chamber, a gas chromatograph, computers and support equipment and seven cameras for documentation.

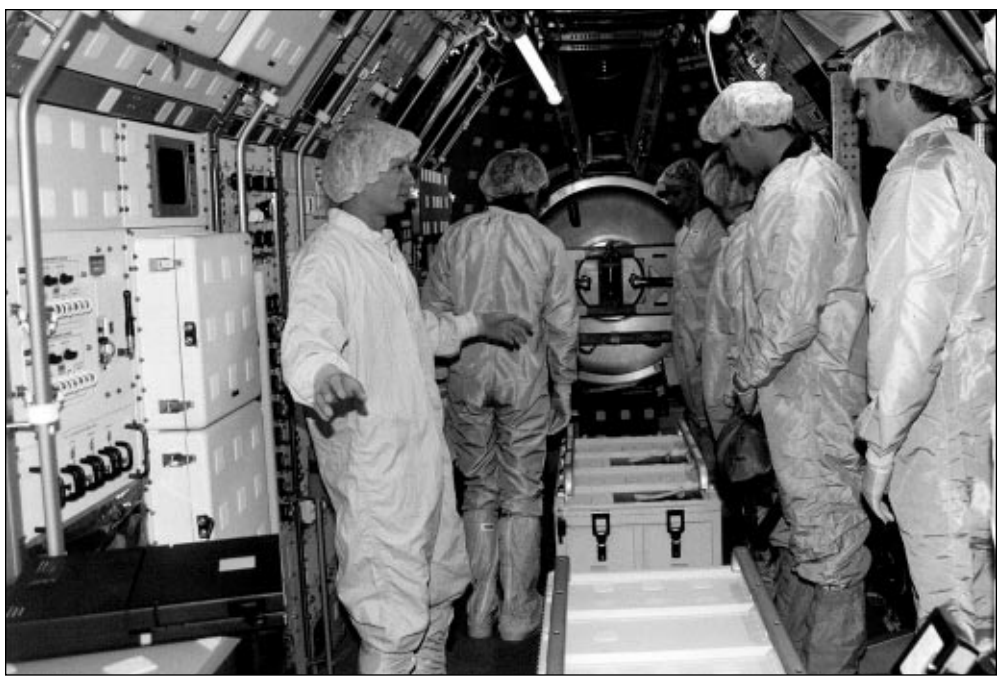
"By doing combustion experiments in microgravity, we can learn things about the basics of the combustion phenomenon that can help us produce more efficient airplane and car engines, power plants, home heating furnaces and boilers," Linteris said. "We can gain a basic understanding which will help us in fire safety, energy production and to reduce pollution."

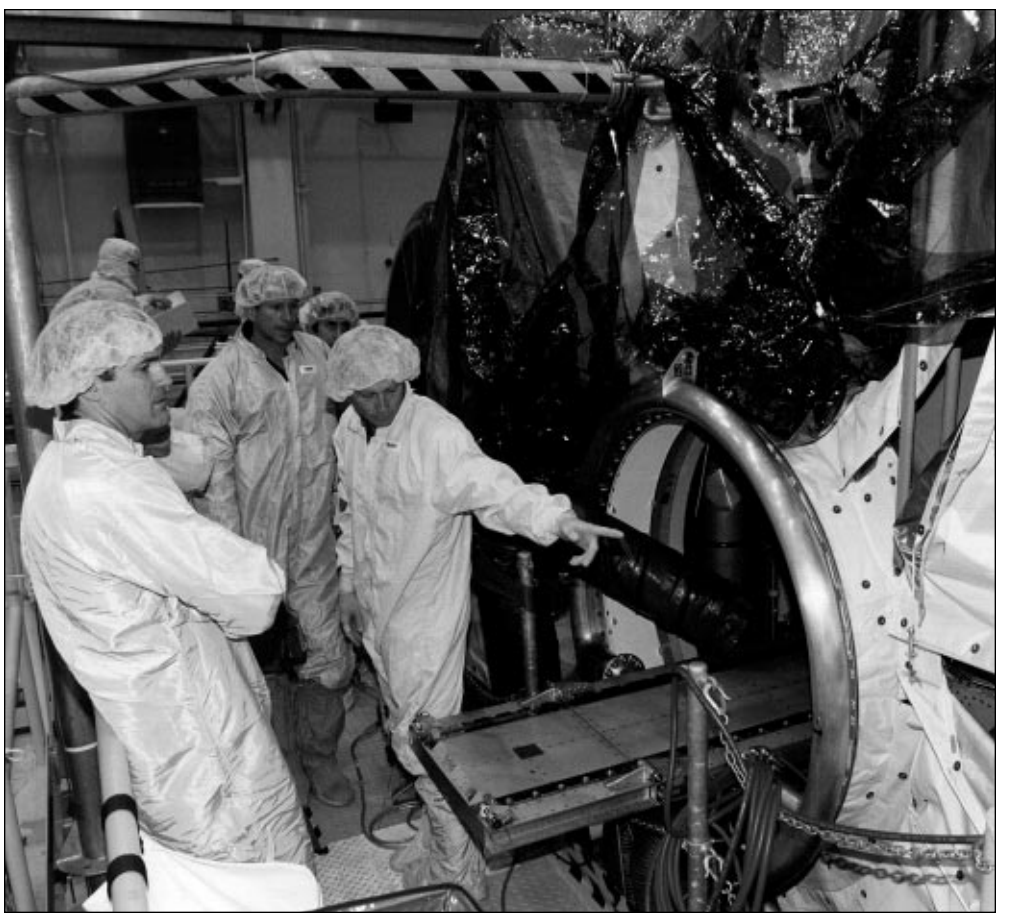
Several experiments will measure microgravity levels and movements of the crew so that scientists can develop space station experiments that will not be perturbed by everyday activity. They also will study the shuttle's orbit to determine whether friction is disturbing onboard experiments. The Orbital Acceleration Research Experiment will give scientists the opportunity to place *Columbia* in an attitude that benefits the experiments.

Glovebox experiments will look at ways of strengthening metal alloys and evaluating how liquids react to ultrasonic radiation pressure exposure.

While the crew is busy in the MSL, a hitchhiker experiment, the Cryogenic Flexible Diode, also will be working in *Columbia*'s payload bay. This experiment will test thermal control technology that is becoming essential for spacecraft telecommunications. Since most spacecraft electronics are packed tightly, heat pipes are needed to remove and redirect heat and cool the electronics so that they may function normally.

The crew also will have the opportunity to talk with amateur radio operators and students from around the world through the Shuttle Amateur Radio Experiment. *Columbia* is scheduled to return to KSC's Shuttle Landing Facility at 6:19 a.m. CDT April 19. ❑





Above: McDonnell Douglas Space Systems engineer Scott Myers, left, answers questions from STS-83 crew members from right, Commander Jim Halsell and Mission Specialist Mike Gernhardt, during the crew equipment interface test at Kennedy Space Center. Right: The crew receives briefings on hardware configurations of the MSL in the Operations and Checkout Bldg at KSC.

NASA Photos KSC-97PC-126 and KSC-97PC-124